CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

**ORDER NO. 89-061**

SITE CLEANUP REQUIREMENTS FOR:

ADVANCED MICRO DEVICES
1165 EAST ARQUES AVENUE FACILITY
SUNNYVALE, SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter called the Board) finds that:

1. Site Location and Description Advanced Micro Devices (AMD) owns an integrated circuit manufacturing facility at 1165 East Arques, Sunnyvale, Santa Clara County, near the intersection of U.S. Highway 101 and the Lawrence Expressway. The facility consists of three buildings (Nos. 1, 2, and 3) used for semiconductor production, assembly, and storage and for offices and laboratories and one building (No. 3A) partially used for product warehousing. Monolithic Memories, Incorporated (MMI) operated the facility from 1970 to 1987 at which time AMD acquired MMI and all of its property. Buildings Nos. 1 and 2 of the facility are currently unoccupied pending a new tenant or buyer. Building No. 3 is partially occupied for small circuit testing and office operations. Building No. 3A is partially used for storage.

2. Regulatory Status AMD is hereinafter referred to as a discharger because of the releases of hazardous wastes that have occurred at its site. AMD is also a Responsible Party under Federal Superfund regulations (CERCLA/SARA), and is a Superfund site on the National Priorities List (NPL). This Order is intended to outline the tasks required for completion of the Remedial Investigation/Feasibility Study (RI/FS) as required by CERCLA/SARA.

3. Site History Waste solvent tanks and underground acid neutralization systems were in place at the site and were operated from 1974 to 1984. Subsurface investigations initiated in early 1982 revealed significant levels of organic chemical pollution in both soil and ground water beneath the site. The soil and some of the ground water pollution was attributed to spills and leaks in the underground wastewater and solvent piping systems. The waste solvent tanks and acid neutralization systems were removed from service in 1984. Beginning in 1985, waste solvents were collected for recycling in a compartmentalized waste solvent tank located in a separate concrete vault adjacent to the new acid neutralization system vault.

Following initial investigations and actions at this site the Board issued waste discharge requirements for this site in 1986.

4. Hydrogeology The AMD site is underlain by a thick sequence of unconsolidated sedimentary materials. Exploratory and well borings performed throughout the site area have determined three general hydrogeological units (the A, B, and C aquifers) within the near-surface zone (<100 foot depth). These water-bearing units are composed of strata of sand, gravelly sand, and interbedded sandy silts and silty clays. The aquifers are separated by strata of silty clay that act as low permeability barriers (aquitards).

   The A aquifer extends from 10 feet below ground surface to a depth of about 25 to 35 feet. The B aquifer is less consistent and varies widely throughout the area, occurring between 30 to 60 feet with varying thicknesses and being completely pinched in some areas. The C Aquifer has not been extensively investigated but appears to begin at 65 feet and ranges to a depth of approximately 100 feet.

   Ground water gradients have been determined to be to the north by northeast in the vicinity of the site in the A and B aquifers. The surface of the semiconfined B aquifer's piezometric surface is higher than the surface of the A aquifer causing an upward gradient which inhibits the migration of chemicals from the A to the B aquifer.

5. Soil Pollution When the Building #2 waste solvent tank was excavated in 1984, soil samples taken from the south side of the excavation pit at approximately the seven-foot depth, nearest to the leaking solvent collection piping, were analyzed and found to contain elevated levels of xylene, ethyl benzene and tetrachloroethene (PCE), up to 3000, 250, and 40 parts per million (ppm), respectively. The samples taken at the northern edge of the pit at approximately the seven-foot depth had considerably lower concentrations (700 ppm of xylene, 20 ppm of ethyl benzene, and 2 ppm of PCE).

   A preexcavation soil investigation conducted to determine if any soil was contaminated in the area planned for the new acid neutralization system revealed that the soil samples taken at depth of 2 to 15 feet below the ground surface contained chemical concentrations of less than 1 ppm. Concentrations of PCE, TCE, and ethyl benzene were nondetectable except for 0.142 ppm ethyl benzene reported at depth of 15 feet for one boring. Xylene and chlorobenzene concentrations ranged from nondetectable to 0.280 ppm.

   During the excavation for a new acid neutralization system in

1984, elevated concentrations of PCE (2000 ppm), xylene (1900 ppm), toluene (110 ppm), trichloroethene (TCE) (9 ppm), and benzene (<30 ppm), were discovered at a depth of two feet. Samples taken at the eight-foot depth showed detectable concentrations of PCE (6 ppm) only.

6. Groundwater Pollution A total of 19 A-level, 15 B-level, and 2 C-level monitoring wells have been installed at the AMD site. The AMD site is located hydrogeologically downgradient of several semiconductor facilities where previous investigations have shown high concentrations of volatile organic compounds (VOCs) in the ground water, including but not limited to TCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethene (1,2-DCE) and Freon 113, which have been referred to as "regional chemicals". A review of MMI's former chemical handling practices and analyses of wastes stored in subsurface tanks indicated that the following compounds originated at the AMD site: PCE, xylene, chlorobenzene, dichlorobenzene, ethyl benzene, alcohols, ketones, and phenols. The vertical extent of these "AMD chemicals" is restricted to the A aquifer while the lateral extent of the AMD chemical plume is approximately Kern Avenue to the north, Lawrence Expressway to the east, and well M37A, approximately 500 feet west of Building #1. (See attached facility map.) Well 37A, however, has consistently shown nondetectable levels of AMD chemicals, indicating that the outer limit to possible chemical contamination is less extensive in the westerly direction than the limit defined here. The "regional chemicals" listed above have been detected in both the A and B aquifers from Kifer Avenue, south of the AMD site, as far downgradient as U. S. Highway 101, north of the AMD site. No VOCs have been detected in the C aquifer in the area.

7. Interim Soil Remedial Actions The acid neutralization tanks and solvent waste tanks located behind both Building Nos. 1 and 2 were removed in 1984. In addition, the area of the new acid neutralization system, as described in Finding 5, was excavated to a depth of 15 feet prior to the installation of the new system. Contaminated soil from these tank excavations was removed for offsite disposal.

8. Interim Ground Water Remedial Actions MMI initiated ground water extraction and treatment in August 1986. The extraction system consists of eight A-level extraction wells with an average system flow rate of 10 gallons per minute ( gpm). The AMD chemical plume appears to be effectively contained within the hydraulic zone of influence of this extraction system.

To cooperate with upgradient contributors to the chemicals in the B aquifer and at the request of Board staff, AMD began ground water extraction in the B aquifer with three extraction wells in July 1988 and appears to have established hydraulic

control in the B aquifer across the AMD site.

AMD's ground water treatment system consists of dual one-foot diameter air strippers. Treated ground water from the air strippers is reused in place of municipal water for industrial process needs at the AMD site. The water is then discharged, under permit to the City of Sunnyvale's wastewater treatment plant.

9. Workplan Because the AMD site is listed on the EPA's NPL, AMD was requested to submit a workplan for a Remedial Investigation/Feasibility Study. AMD submitted a workplan on June 9, 1988, and revisions of that workplan on March 1, 1989, and March 22, 1989.

10. Scope of this Order On August 20, 1986, the Board adopted Order No. 86-64 which prescribed Waste Discharge Requirements to the discharger and established tasks and time schedules to define the extent of the contaminants and implement interim remedial actions. The intent of this Order is to supersede the requirements of Order No. 86-64 by updating the status of the site and prescribing a time schedule to complete final investigations and evaluate final remedial action alternatives, and in so doing, approve the workplan referenced in Finding 9 above. This Order rescinds Order No. 86-64.

11. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986. The Basin Plan contains water quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and ground waters.

12. The existing and potential beneficial uses of the ground water underlying the AMD and adjacent sites include:

    a. Municipal and domestic water supply
    b. Industrial process and service water supply
    c. Agricultural water supply

13. The discharger has caused or permitted, and threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance.

14. This action is an Order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the CEQA pursuant to Section 15321 of the Resources Agency Guidelines.

15. Interim containment and cleanup measures need to be implemented to alleviate the threat to the environment posed by the continued migration of pollutants and to provide a

substantive technical basis for designing and evaluating the effectiveness of final cleanup alternatives.

16. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.

17. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the discharger shall cleanup and abate the effects described in the above findings as follows:

A. **PROHIBITIONS**

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.

2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.

B. **SPECIFICATIONS**

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.

2. The discharger shall conduct monitoring activities as outlined in an Amended Sampling and Analysis Plan, approved by the Executive Officer, to define the current local hydrogeologic conditions, and the lateral and vertical extent of soil and groundwater pollution. Should monitoring results show evidence of pollutant migration, additional characterization of pollutant extent may be required.

C. **PROVISIONS**

1. The discharger shall comply with Prohibitions A.1., A.2., and A.3., and Specifications B.1. and B.2. immediately except as modified in accordance with the following tasks and time schedule:

COMPLETION DATE/TASK

a) 1) COMPLETION DATE: **MAY 19, 1989**

TASK: AMEND SAMPLING AND ANALYSIS PLAN Submit an amended Sampling and Analysis Plan (SAP), consisting of the Quality Assurance Project Plan and Field Sampling Plan, which is consistent with the latest EPA RI/FS Guidance Document and appropriate referenced documents therein. Data Quality Objectives for all media for all data used shall be established in the SAP in a manner consistent with EPA's "Data Quality Objectives for Remedial Response Action" Document (March 1987).

2) COMPLETION DATE: **MAY 19, 1989**

TASK: AMEND HEALTH AND SAFETY PLAN Submit an amended Health and Safety Plan which is consistent with the latest EPA RI/FS Guidance Document and appropriate referenced documents therein.

b) 1) COMPLETION DATE: **JUNE 9, 1989**

TASK: EVALUATE DATA ON EXTENT OF SOIL POLLUTION Submit a technical report acceptable to the Executive Officer containing an evaluation of the need for additional soil borings or other methods to define the nature and extent of soil pollution onsite and, if necessary, a proposal for additional soil pollution characterization.

2) COMPLETION DATE: **OCTOBER 6, 1989**

TASK: CHARACTERIZE EXTENT OF SOIL POLLUTION Submit, based on the technical report submitted for Task 1.b)1), a technical report acceptable to the Executive Officer documenting completion

of the installation and sampling of onsite soil borings or other methods to define the nature and extent of soil pollution onsite.

3) COMPLETION DATE: **OCTOBER 6, 1989**

TASK: PROPOSE SOIL REMEDIATION ALTERNATIVES Submit, based on the technical reports submitted for Tasks 1.b)1) and 1.b)2), a technical report acceptable to the Executive Officer proposing soil remediation alternatives and any pilot or treatability studies for any polluted soils onsite.

c) 1) COMPLETION DATE: **JUNE 9, 1989**

TASK: REVIEW AND EVALUATE WELL SURVEY CONDUCTED BY WEISS ASSOCIATES IN DECEMBER 1986 Submit a technical report acceptable to the Executive Officer containing an evaluation of the Weiss Associates' Well Survey and the need for an additional well records search to expand the well location survey. The technical report should also contain a proposal, if necessary, for conducting the well records search, expanding the well location survey, and compiling a well inventory including names of owners, their status, and their respective locations.

2) COMPLETION DATE: **OCTOBER 6, 1989**

TASK: COMPLETE EXPANDED WELL SURVEY Submit, based on the technical report submitted for 1.c)1), a technical report acceptable to the Executive Officer documenting the completion of a well records search and an expanded well location survey.

d) 1) COMPLETION DATE: **DECEMBER 29, 1989**

TASK: SUBMIT DRAFT REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT AND PROPOSED REMEDIAL ACTION PLAN Submit a technical report acceptable to the Executive Officer, pursuant to the workplan described in Finding 9, containing the results of the remedial investigation, an evaluation of the installed

interim remedial measures, a feasibility study evaluating alternative final remedial measures, the recommended measures necessary to achieve final cleanup objectives, and the time schedule necessary to implement the recommended final remedial measures.

2) COMPLETION DATE: **MAY 4, 1990**

TASK: SUBMIT FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT AND PROPOSED REMEDIAL ACTION PLAN Submit a technical report acceptable to the Executive Officer based on the technical report submitted for Task 1.d)1) and agency comments on the technical report submitted for Task 1.d)1).

2. This Order approves the workplan described in Finding 9 above.

3. All technical reports submitted must be acceptable to the Executive Officer. The submittal of technical reports evaluating interim and final remedial measures shall include a projection of the cost, effectiveness, benefits, and impact on public health and the environment of each alternative measure.

4. Any proposal for the discharge of extracted ground water must initially consider the feasibility of reclamation, reuse, or discharge to a publicly owned treatment works (POTW), as specified in Board Resolution No. 88-160. If it can be demonstrated that reclamation, reuse, or discharge to a POTW is technically and economically unfeasible, a proposal for discharge to surface water shall be considered. Such proposal for discharge to surface water shall include the above demonstration and a completed application for an NPDES permit.

5. The Remedial Investigation and Feasibility Study shall be consistent with the guidance provided by Subpart F of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300); Section 25356.1 (c) of the California Health and Safety Code; CERCLA guidance documents with reference to Remedial Investigation, Feasibility Studies, and Removal Actions; and the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California".

6. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order, the discharger shall promptly notify the Executive Officer prior to the required completion date.

7. The discharger shall submit to the Board acceptable self-monitoring program reports containing results of work performed according to a program as described in the Amended SAP, approved by the Executive Officer.

8. The self-monitoring program reports shall also summarize the status of compliance with the Prohibitions, Specifications, and Provisions of this Order and shall be submitted on a quarterly basis, according to the schedule below, commencing with the report for the third quarter 1989, due October 31, 1989.

| Quarter | 1st quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Period | Jan-March | April-June | July-Sept | Oct-Dec |
| Due Date | April 30 | July 31 | October 31 | January 31 |

The quarterly reports shall include;

a. a summary of work completed since the previous quarterly report,
b. appropriately scaled and labeled maps showing the location of all monitoring wells, extraction wells, and existing structures,
c. updated water table and piezometric surface maps for all affected water bearing zones, or alternatively, isoconcentration maps for key contaminants in all affected water bearing zones,
d. a cumulative tabulation of all well construction data, groundwater levels and chemical analysis results for site monitoring wells as specified in the amended SAP,
e. a cumulative tabulation of volume of extracted groundwater and chemical analysis for all site groundwater extraction wells,
f. identification of potential problems which will cause or threaten to cause noncompliance with this Order and what actions are being taken or planned to prevent these obstacles from resulting in noncompliance with this Order, and
g. in the event of noncompliance with the Provisions and Specifications of this Order, the report shall include written justification for noncompliance and proposed actions to achieve compliance.

9. Until such time as the Amended SAP is approved by the Executive Officer, the existing self-monitoring program, as proposed by AMD and approved by Board staff at a February 23, 1988, meeting, shall remain in full force and effect, with reports due according to the existing schedule.

10. All hydrogeological plans, specifications, reports, and documents shall be signed by or stamped with the seal of a registered geologist, engineering geologist or professional engineer.

11. All samples shall be analyzed by State certified laboratories or laboratories accepted by the Board using approved EPA methods for the types of analyses to be performed. All laboratories shall maintain Quality Assurance/Quality Control records for Board review.

12. The discharger shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.

13. Three copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the Board.

14. Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the following agencies:

    a. Santa Clara Valley Water District
    b. Santa Clara County Health Department
    c. City of Sunnyvale
    d. State Department of Health Services/TSCD
    e. U. S. EPA Region IX

    The Executive Officer may additionally require copies to be provided to a local repository for public use.

15. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:

    a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

b. Access to copy any records required to be kept under the terms and conditions of this Order.

c. Inspection of any monitoring equipment or methodology implemented in response to this Order.

d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.

16. The discharger shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.

17. If any hazardous substance, as defined pursuant to Section 25140 of the Health and Safety Code, is discharged to any waters of the state, or discharged and deposited where it is, or probably will be discharged to any waters of the state, the discharger shall report such discharge to this Regional Board, at (415) 464-1255 on weekdays during office hours from 8 a.m. to 5 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-business hours. A written report shall be filed with the Regional Board within five (5) working days and shall contain information relative to: the nature of waste or pollutant, quantity involved, duration of incident, cause of spill, Spill Prevention, Control, and Countermeasure Plan (SPCC) in effect, if any, estimated size of affected area, nature of effect, corrective measures that have been taken or planned, and a schedule of these activities, and persons/agencies notified.

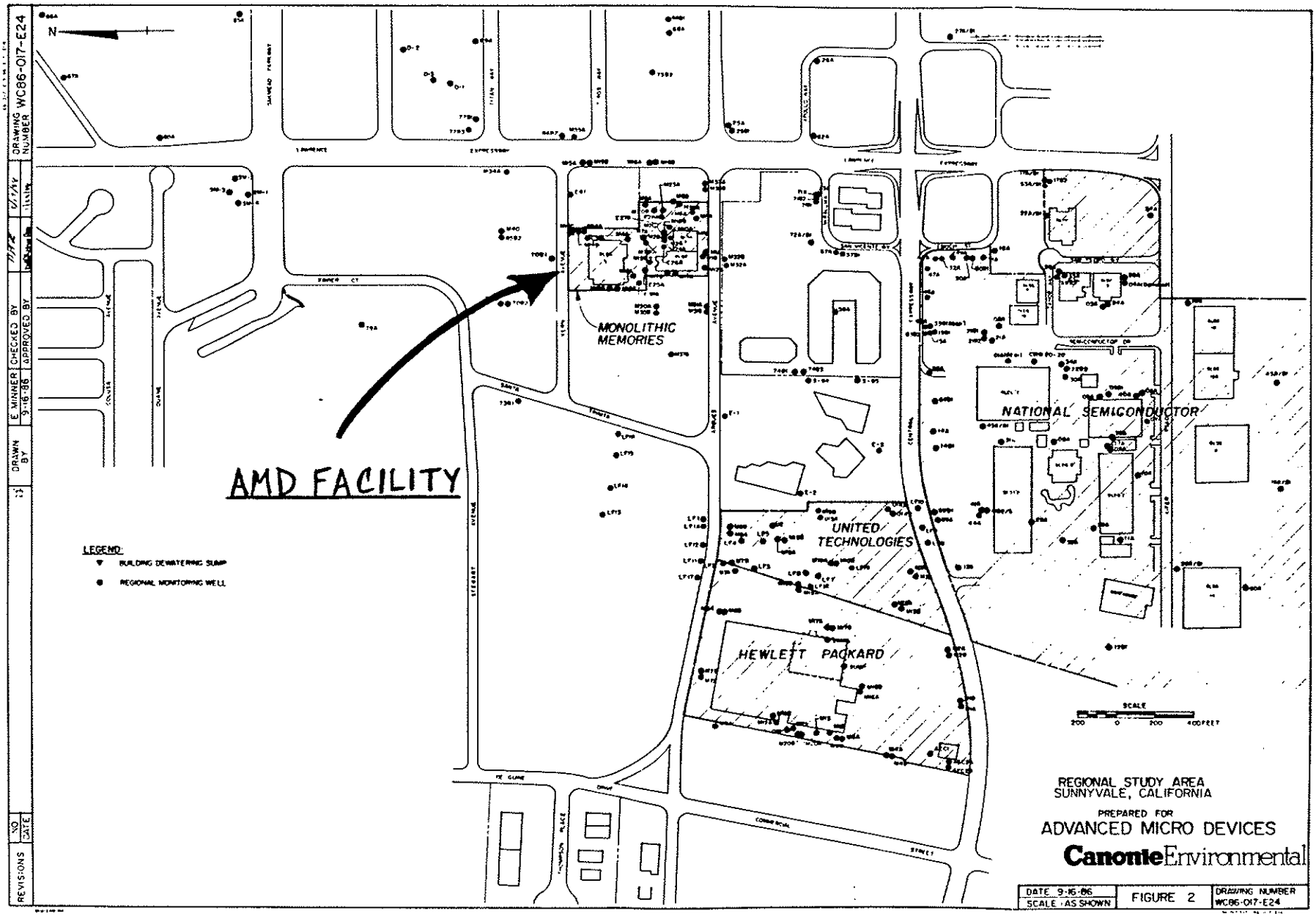
18. Order No. 86-64 is hereby rescinded.

19. The Board will review this Order periodically and may revise the requirements when necessary.

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on April 19, 1989.

Steven R. Ritchie
Executive Officer

Attachments: Regional Study Area Map
AMD Facility Map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AMD FACILITY
MONOLITHIC MEMORIES
UNITED TECHNOLOGIES
NATIONAL SEMICONDUCTOR
HEWLETT PACKARD
LEGEND
BUILDING DEWATERING SUMP
REGIONAL MONITORING WELL
SCALE
200 0 200 400 FEET
REGIONAL STUDY AREA
SUNNYVALE, CALIFORNIA
PREPARED FOR
ADVANCED MICRO DEVICES
CanonieEnvironmental
DATE 9-16-86
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FIGURE 2
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E. MINNER 9-16-86
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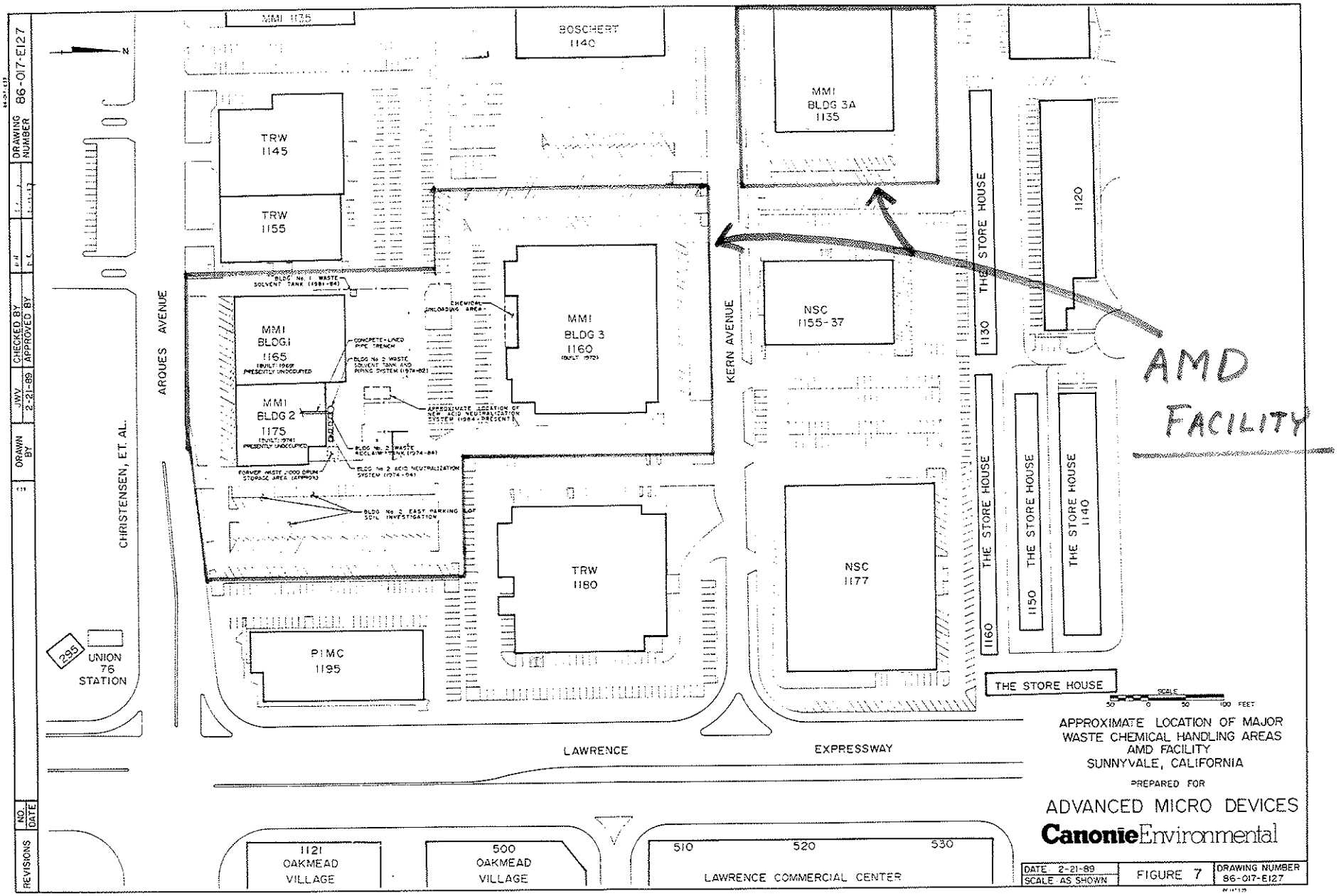
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BOSCHERT 1140
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THE STORE HOUSE
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AMD FACILITY
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ARQUES AVENUE
CHRISTENSEN, ET. AL.
THE STORE HOUSE 1150
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THE STORE HOUSE 1160
TRW 1180
NSC 1177
PIMC 1195
THE STORE HOUSE
UNION 76 STATION
LAWRENCE EXPRESSWAY
1121 OAKMEAD VILLAGE
500 OAKMEAD VILLAGE
510 520 530
LAWRENCE COMMERCIAL CENTER
SCALE
50 0 50 100 FEET
APPROXIMATE LOCATION OF MAJOR WASTE CHEMICAL HANDLING AREAS
AMD FACILITY
SUNNYVALE, CALIFORNIA
PREPARED FOR
ADVANCED MICRO DEVICES
CanonieEnvironmental
DATE 2-21-89
SCALE AS SHOWN
FIGURE 7
DRAWING NUMBER 86-017-E127
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